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ABSTRACT

A nationwide survey of 999 two-year colleges was conducted to collect data concerning computer-related expenditures at the colleges and to facilitate interinstitutional comparisons of these data. The survey collected data on current annual operating expenditures, Fall 1979 credit student headcount, and current annual outlays for: (1) "normal" computer expenditures, i.e., the ongoing operating expenditures devoted to academic and administrative computer support; and (2) "total" computer costs, i.e., the sum of "normal" operating expenditures, plus expenditures for leases, computer development, and computer capital purchases. Analysis of the responses from 308 colleges involved the calculation of ratios expressing both computer-expenditure categories in relation to total college operating expenditures and in relation to college student headcount. For purposes of comparison, aggregate ratios were determined for four institutional size categories based on student headcounts: less than 1,000 students; 1,001 to 5,000 students; 5,001 to 15,000 students; and over 15,000 students. The study report examines limitations, details methodology, and presents the aggregate ratios on a series of tables. The range of findings determined within each size category are also presented. (JP)

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ALLOCATION OF RESOURCES TO COMPUTER SUPPORT IN TWO-YEAR COLLEGES

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I. INTRODUCTION

A. PURPOSE

This paper is the result of an intensive year-long effort to develop, for the first time, data on levels of computer-related expenditures for two-year colleges across the nation. Many studies have been conducted of various aspects of college computer operations. In most instances however, the results of such surveys have not been susceptible to statistical aggregation and analysis. In consequence, it has usually not been possible to meaningfully relate their findings to the experience of individual institutions in any really satisfactory way. The result has often been a plethora of data--useful in one or another degree for the purposes for which they were gathered--but lacking inter-institutional comparability. It has seldom been possible to answer the fundamental question of how an institution stands vis-a-vis its peers in regard to allocation of resources to the computer function.

The study reported on here has plowed new ground in seeking simple, comparable data on computer costs. Severe discipline in regard to the definition of the data selected for collection, aggregation, and analysis has yielded such simple but meaningful information on computer-related expenditures in relation to total college expenditures and to credit student headcount. This is a case where less is more. The extremely constrained request for data has yielded more useful and meaningful results than has any such study conducted previously.

The central purpose of this paper is to provide answers to the eternal question in regard to computer expenditures: how do allocations of resources to the computer function for one's own institution compare with those for other comparable two-year institutions? The payoff from the study comes from comparing expenditure levels for a given institution with the array of such data for institutions of similar size. Such comparisons do not tell an institution whether it is spending too much or too little or whether it is spending wisely or not. But they do tell an institution something it has not previously been able to ascertain. This is whether the institution's computer-related expenditures--as a percentage of total operating expenditures and in dollars per credit headcount student--are high, medium, or low relative to expenditures of other similarly sized institutions.

This study also provides these data not alone for basic computer operating expenditures but also for the sum of these "normal" costs plus annual equipment lease costs and those major developmental and capital costs periodically incurred by most institutions. Finally, it displays the breakdown of computer operating expenditures between administratively-related and academically-related support as well as the proportions that each of these latter two categories are of the total.

The results should help boards and administrations evaluate the extent to which their own experience represents where they believe they are and where they want to be in regard to resources allocated to computer support to their administrative and academic programs and processes.

B. METHODOLOGY

The study's basic methodology included the following steps:

- Following proposal and endorsement of the basic study effort by the NACUBO Two-Year Colleges Committee, a study design was developed, reviewed with staff of NACUBO and CAUSE, and confirmed.

- A mailing list and mailing labels addressed to chief financial/business officers were provided by CAUSE for 999 institutions of the some 1,234 two-year institutions; included were all institutions for which CAUSE files showed names and addresses of chief financial/business officers.

- A questionnaire was developed, reviewed by NACUBO and CAUSE staff, and forwarded over the signature of D. F. Finn, Executive Director of NACUBO, with a request for cooperation to each of the 999 chief business/financial officers.

- The questionnaires were returned to Cuyahoga Community College (CCC), Cleveland, Ohio, which had volunteered to undertake and contribute the programming, processing, and analytical effort.

- CCC developed the programming and conducted test runs on the first returns. CCC also audited all returns, developing a computerized questionnaire audit program for this purpose.

- Some 376 questionnaires were ultimately received. Every effort was then made to verify questionable data, mainly through telephone callbacks to individual institutions.

- Based on the audited and corrected computer printouts of data, the results for the remaining 308 useful responses were analyzed, and a monograph was drafted, reviewed and edited by NACUBO staff, and is about to be published.

C. RELIABILITY OF STUDY DATA

In reviewing these data it should be borne in mind that it is probable that:

- Actual values at the percentiles shown for the category 0-1000 credit headcount students should be slightly lower than shown due to under reporting of some institutions with no computer expenditures.

- Actual values at the percentiles shown for the categories of 5001-15000 and, especially, of over 15,000 credit headcount students probably should be somewhat higher than shown due to likely underreporting of some computer expenditures incurred in decentralized organization units and budgets.

- Allocations of "normal" computer operating expenditures between administrative and academic support typically reflect judgment

based on utilization of one of several possible bases for such allocation.

The compelling virtue of this study is that it deals only with major concepts: e.g., headcount, total college operating expenditures, total computer operating expenditures, and the overall breakdown of costs between administrative support and academic support; these "big" numbers are those figures that institutions are able to provide with greatest reliability. In addition, the survey response ratio was extremely high, i.e., one in three, and the number of institutions in each size cell is, statistically speaking, very satisfactory. Although perfectly precise data from all 1,234 two-year colleges would vary from those reported herein, it seems evident that the difference between the two sets of numbers could be expected, percentagewise, to be quite small.

The overall conclusion as to reliability is that this study has produced essentially valid results and that the data may be used for purposes of comparison with the experience of one's own institution with a relatively high degree of confidence.

II. STUDY DESIGN

First, the basic study design developed comparative data of two major types, as follows:

- Computer expenditures in relation to college total operating expenditures.
- Computer expenditures in relation to college credit student headcount.

Second, within each of these two categories, five sets of data are presented--i.e., for all institutions and for each of the four peer category size groupings--as follows:

- All institutions.
- Institutions with up to 1,000 credit student headcount.
- Institutions with 1,001 to 5,000 credit student headcount.
- Institutions with 5,001 to 15,000 credit student headcount.
- Institutions with over 15,000 credit student headcount.

Third, for each of these five institutional groupings, data are provided for five percentiles, as follows:

- The 12.5th percentile, which indicates the modal figure for the first, or lowest, quarter of responses in the array of institutions.

- The 37.5th percentile, which indicates the modal figure for the second quarter of responses in the array.

- The 50th percentile, which indicates the median figure for all institutions in the array, i.e., a value whose characteristic is such that as many responses are below as are above it.

- The 62.5th percentile, which indicates the modal figure for the third quarter of responses in the array.

- The 87.5th percentile, which indicates the modal figure for the fourth or highest quarter of responses in the array.

Fourth, these matrices are then used to define and express the substantive survey data, i.e., (1) various categories of computer expenditures as percentages of total college operating expenditures, (2) various categories of computer expenditures per credit headcount student, and (3) academic and administrative computer expenditures as percentages of "normal" computer operating expenditures.

Four sets of computer expenditures are calculated in the NACUBO-published study for comparison with college total operating expenditures and with credit student headcount but only two of these are presented in this paper:

- First is "normal" computer operating expenditures, i.e., the ongoing operating costs of a college's computer function.

- Second is the sum of (1) these "normal" computer operating expenditures plus (2) ongoing lease expenditures, computer development expenditures, and computer capital purchase expenditures. This sum totals all computer-related outlays by the institution for the year, both "ongoing" and "one-shot".

In addition "normal" computer operating expenditures allocated to academic and to administrative costs are calculated for comparison with the total of such "normal" computer operating expenditures and with credit student headcount.

Fifth, study findings are for several reasons based on headcount statistics. These are the standard enrollment statistics reported to and by the AACJC. They do not require special rules for translation into FTES. They are a suitable basis for a sort of institutions by size for purposes of this analysis. In addition, many categories of computer expenditures--e.g., for such student services as enrollment, student billing, and grade recording--vary more directly in proportion to student headcount than to some theoretically-calculated full-time equivalent student value.

Sixth, institutions were requested to supply data for their most recent 12-month accounting period and, in the great bulk of cases, did so for the 1979-1980 year.

III. FINDINGS

A. COMPARISON OF KEY FINDINGS AMONG PEER CATEGORY SIZE GROUPINGS

Following is a summary of key findings among institutional groupings.

1. Computer Expenditures as Percent of Total College Operating Expenditures

Table 1. "Normal" Computer Operating Expenditures as Percent of College Total Operating Expenditures

	No. in Sample	Percentiles 12.5th	37.5th	50th	62.5th	87.5th
Total	308	0.3%	1.4%	1.9%	2.4%	4.2%
0 - 1,000	45	0.0%	0.1%	0.2%	0.6%	2.9%
1,001 - 5,000	146	0.4%	1.4%	1.9%	2.2%	3.8%
5,001 - 15,000	79	0.9%	1.9%	2.4%	3.0%	4.6%
Over 15,000	38	1.0%	2.0%	2.1%	2.8%	4.9%

- In general, the proportion of college total operating expenditures spent for "normal" computer operating expenditures increased with size of institutions.
- Median (or 50th percentile) figures for "normal" computer expenditures ranged from 0.2% for the 0 - 1,000 size institution to 2.4% for the 5,001 - 15,000 student group and 2.1% for the over 15,000 group. Modal figures for the upper quarter ranged from 2.9% to 4.9%.

Table 2. Total Computer-Related Expenditures as Percent of College Total Operating Expenditures

	No. in Sample	Percentiles 12.5th	37.5th	50th	62.5th	87.5th
Total	308	0.6%	2.2%	2.7%	3.5%	6.4%
0 - 1,000	45	0.0%	0.1%	0.6%	0.8%	4.4%
1,001 - 5,000	146	1.0%	2.0%	2.4%	3.1%	5.9%
5,001 - 15,000	79	1.3%	2.9%	3.5%	4.2%	6.8%
Over 15,000	38	1.5%	2.9%	3.6%	4.2%	8.6%

- Median figures for total computer-related expenditures ranged from 0.6% for the smallest institutions to 3.6% for the largest. Modal figures for the upper quartile ranged from 4.4% to 8.6% respectively.
- While not shown here, for the 308 institutions as a whole and for the three larger size groups, about a third of "normal"

computer operating expenditures for the median institutions were for academic support and about two-thirds for administrative support

2. Computer Expenditures Per Credit Headcount Student

Table 3. "Normal" Computer Operating Expenditures Per Credit Headcount Student

	No. in Sample	Percentiles 12.5th	37.5th	50th	62.5th	87.5th
Total	308	$ 5	$20	$27	$33	$62
0 - 1,000	45	0	3	6	11	90
1,001 - 5,000	146	6	22	29	35	60
5,001 - 15,000	79	10	22	29	33	54
Over 15,000	38	7	21	26	29	44

- For the three larger institutional categories, "normal" computer operating expenditures ranged at the medians from $26 to $29 per credit headcount student, $29 to $35 per student as the modal figures for the third quarter, and $44 to $60 per student as the modal figures for the upper quarter.

Table 4. Total Computer-Related Expenditures Per Credit Headcount Student

	No. in Sample	Percentiles 12.5th	37.5th	50th	62.5th	87.5th
Total	308	$ 7	$30	$38	$49	$103
0 - 1,000	45	0	3	9	39	150
1,001 - 5,000	146	12	30	38	49	97
5,001 - 15,000	79	10	33	41	47	89
Over 15,000	38	12	31	39	49	79

- Per student expenditures for total computer-related costs for the three larger categories of institutions ranged at the median from $38 to $41 per student, $47 to $49 as the modal figures for the third quarter, and $79 to $97 as the modal figures for the upper quarter.

- These two tables thus show that while expenditures per student were much less for the 0-1,000 student institutions than for the larger categories, experience did not differ greatly among the three larger categories for most percentiles reported on.

3. College Total Operating Expenditures Per Credit Headcount Student

Tables 1 and 2 above indicated that computer expenditures as a percent of college total operating expenditures increased substantially as size of peer group increased. Tables 3 and 4 indicated

that computer expenditures among the three larger peer groups of institutions were more or less similar per credit headcount student. The explanation for this is necessarily found in college total operating expenditures per student that on the average decreased with increasing size of institutional peer groups. This progression is shown below.

Table 5. College Total Operating Expenditures Per Credit Headcount Student

	No. in Sample	Percentiles 12.5th	37.5th	50th	62.5th	87.5th
Total	308	$ 893	$1,243	$1,473	$1,780	$2,807
0 - 1,000	45	1,732	2,443	2,977	3,569	4,593
1,001 - 5,000	146	1,038	1,421	1,708	1,906	2,458
5,001 - 15,000	79	843	1,062	1,147	1,254	1,600
Over 15,000	38	644	915	993	1,111	1,484

As this table indicates, per credit headcount student costs in all percentile categories declined significantly for each successively larger group of institutions. The principal reason for this appears to be that, on the average, the larger the institution, the higher the ratio of credit headcount students to full-time equivalent students (i.e., the larger the percentage of students taking only a few credits)--and thus the lower the level of college total operating costs per headcount student. As probably a lesser factor, the smaller institutions include a higher percentage of private institutions with considerably higher budgets relative to student numbers than do the larger categories. It is believed that calculations based on full-time equivalent student numbers would tend to show computer costs per headcount student increasing with peer group size as do computer-related expenditures as percentages of college total operating expenditures.

B. COMPARISON OF KEY FINDINGS WITHIN PEER CATEGORY SIZE GROUPINGS

This section reports on categories of computer expenditures in relation to college total operating expenditures and to credit student headcount. Selected survey results are analyzed first for all 308 institutions and then for each size peer group. Two tables are presented in each sub-section.

- The first table summarizes the key findings for four ratios relating to college total operating expenditures, as follows:
  - First, "normal" computer operating expenditures as a percent of college total operating expenditures.
  - Second, total computer-related expenditures as a percent of college total operating expenditures.

- Third, academic program computer support as a percent of "normal" computer operating expenditures.

- Fourth, administrative program computer support as a percent of "normal" computer operating expenditures.

- The second table in each sub-section summarizes per credit headcount student expenditures for these same four categories of computer expenditures.

1. Category I: All 308 Reporting Institutions in the Sample

As noted earlier, some 308 institutions provided valid and usable responses to this survey.

Table 6. Computer Expenditures as Percent of College Total Operating Expenditures and Allocation between Academic and Administrative Support--All 308 Institutions

	Percentiles				
	12.5th	37.5th	50th	62.5th	87.5th
Computer Operations	0.3%	1.4%	1.9%	2.4%	4.2%
Total Computer Costs	0.6%	2.2%	2.7%	3.5%	6.4%
Academic Costs*	0.0%	20.0%	30.0%	40.0%	63.0%
Administrative Costs*	20.8%	52.8%	64.0%	74.1%	98.2%

- For all 308 participating institutions the median experience was "normal" computer operating expenditures at 1.9% of college total operating expenditures and all computer-related expenditures at 2.7%. Modal figures for the upper quarter of all institutions were 4.2% and 6.4%, respectively.**

- The median experience showed 30% of "normal" computer operating expenditures for academic support and 64% for administrative support. Modal figures for the upper quarter were 63% and 98.2%, respectively respectively.

*With regard to the last two rows of percentage statistics in this and subsequent similar tables, because each statistic has a different institution at its percentile value, proportions do not add to 100%.

**Comparisons in the text are made with the median experience for the entire group as the most representative figures available. Comparisons are also made with the modal figure for the upper quarter of institutions on the assumption that readers of this report will be particularly interested in the experience of colleges whose expenditure ratios indicate a major commitment for utilization of the computer in the work of the institution.

Table 7 - Computer Expenditures Per Credit Headcount Student--
All 308 Institutions

	Percentiles				
	12.5th	37.5th	50th	62.5th	87.5th
Computer Operations	$ 5	$ 20	$ 27	$ 33	$ 62
Total Computer Costs	7	30	38	49	103
Academic Costs*	0	4	7	10	25
Administrative Costs*	2	12	15	20	44

- The median experience for "normal" computer operating expenditures was $27 per credit headcount student and $38 for total computer-related expenditures. Modal figures for the upper quarter were $62 and $103, respectively.

- Medians for "normal" computer operating expenditures per credit headcount student were $7 for academic support and $15 for administrative support. The comparable modal data for the upper quarter of institutional experience were $25 and $44 per student, respectively.

2. Category II: Institutions with Credit Headcount Enrollment of 0 - 1,000 Students

Some 45 institutions of up to 1,000 students provided useful results. A number of very small institutions reported that they had no computer-related expenditures. Those with no computer-related expenditures that also reported total operating expenditures were included in these statistics as valid data elements while those that did not do so necessarily were excluded. As a result, the number of institutions reported on in the lower end of the array for this size group category is understated in relation to the total of responses received, and all percentile values reported are, consequently, somewhat overstated.

Table 8. Computer Expenditures as Percent of College Total Operating Expenditures and Allocation between Academic and Administrative Support--0 - 1,000 Student Category

	Percentiles				
	12.5th	37.5th	50th	62.5th	87.5th
Computer Operations	0.0%	0.1%	0.2%	0.6%	2.9%
Total Computer Costs	0.0%	0.1%	0.6%	0.8%	4.4%
Academic Costs	0.0%	0.0%	0.0%	13.0%	60.0%
Administrative Costs	0.0%	25.0%	64.0%	76.8%	100.0%

*The last two rows of dollar statistics in this and subsequent similar tables will typically not add to the dollar values in the first row because each statistic has a different institution at its percentile value.

- Medians for "normal" computer operating expenditures were 0.2% of college total operating expenditures and for total computer-related expenditures were 0.6%. Modal results for the upper quarter were 2.9% and 4.4%, respectively.

  The median experience showed 0% of the "normal" computer operating expenditures for academic support and 64.0% for administrative support. Modal figures for the upper quarter were 60% and 100%, respectively.

Table 9 - Computer Expenditures Per Credit Headcount Student--0 - 1,000 Student Category

	Percentiles				
	12.5th	37.5th	50th	62.5th	87.5th
Computer Operations	$ 0	$ 3	$ 6	$ 11	$ 90
Total Computer Costs	0	3	9	39	150
Academic Costs	0	0	0	2	19
Administrative Costs	0	1	4	9	57

- For the median institution, "normal" computer operating expenditures per credit headcount student were $6 and total computer-related expenditures were $9. Modal experience for the upper quarter of institutions was $90 and $150, respectively.

- Medians for "normal" computer operating expenditures per credit headcount student were $0 for academic support and $4 for administrative support. Comparable data for the upper quarter were $19 and $57 per student, respectively.

3. Category III: Institutions with Credit Headcount Enrollment of 1,001 - 5,000 Students

Some 146 institutions reported in this size category.

Table 10. Computer Expenditures as Percent of College Total Operating Expenditures and Allocation between Academic and Administrative Support--1,001 - 5,000 Student Category

	Percentiles				
	12.5th	37.5th	50th	62.5th	87.5th
Computer Operations	0.4%	1.4%	1.9%	2.2%	3.8%
Total Computer Costs	1.0%	2.0%	2.4%	3.1%	5.9%
Academic Costs	0.0%	20.0%	33.1%	41.3%	67.8%
Administrative Costs	23.4%	49.7%	60.3%	71.8%	100.0%

- Medians for "normal" computer operating expenditures were 1.9% of college total operating expenditures and 2.4% for total computer-related expenditures. Modal data for the upper quarter were 3.8% and 5.9%, respectively.

- The median figures were 33.1% of total "normal" computer operating expenditures for academic support and 60.3% for administrative support. Modal data for the upper quarter were 67.8% and 100%, respectively.

Table 11. Computer Expenditures Per Credit Headcount Student--1,001 - 5,000 Student Category

	Percentiles				
	12.5th	37.5th	50th	62.5th	87.5th
Computer Operations	$ 6	$ 22	$ 29	$ 35	$ 60
Total Computer Costs	12	30	38	49	97
Academic Costs	0	4	8	12	27
Administrative Costs	3	12	15	20	38

- The median institutions spent $29 per credit headcount student for "normal" computer operating expenditures and $38 for total computer-related expenditures. Modal data for the upper quarter were $60 and $97, respectively.

- The median figures were $8 per student for "normal" computer operating expenditures for academic support and $15 per credit headcount student for total computer-related expenditures. Modal figures for the upper quarter were $27 and $38 per student, respectively.

4. Category IV: Institutions with Credit Headcount Enrollment of 5,001 - 15,000 Students

Some 79 institutions provided responses in this size category.

Table 12. Computer Expenditures as Percent of College Total Operating Expenditures and Allocation Between Academic and Administrative Support--5,001 - 15,000 Student Category

	Percentiles				
	12.5th	37.5th	50th	62.5th	87.5th
Computer Operations	0.9%	1.9%	2.4%	3.0%	4.6%
Total Computer Costs	1.3%	2.9%	3.5%	4.2%	6.8%
Academic Costs	8.3%	28.0%	34.9%	44.1%	60.0%
Administrative Costs	37.5%	51.2%	60.5%	70.7%	89.5%

This and the over 15,000 student categories of institutions spent higher percentages of their budgets for computer services than did the 0 - 1,000 and 1,001-5,000 credit student headcount groups.

- The median institution spent 2.4% of college total operating expenditures for "normal" computer operating expenditures and 3.5% for total computer-related expenditures. Modal figures for the upper quarter were 4.6% and 6.8%, respectively.

- The median institutions spent 34.9% of "normal" computer operating expenditures for academic support and 60.5% for administrative support. Modal figures for the upper quarter were 60% and 89.5%, respectively.

Table 13 - Computer Expenditures Per Credit Headcount Student--5,001 - 15,000 Student Category

	Percentiles				
	12.5th	37.5th	50th	62.5th	87.5th
Computer Operations	$ 10	$ 22	$ 29	$ 33	$ 54
Total Computer Costs	10	33	41	47	89
Academic Costs	2	6	7	10	22
Administrative Costs	4	14	16	22	37

- The median institutions spent $29 per credit headcount student for "normal" computer operating expenditures and $41 for total computer-related expenditures. Modal figures for the upper quarter were $54 and $89, respectively.

- The median figures for "normal" computer operating expenditures were $7 per student for academic support and $16 for administrative support. Comparable modal figures for the upper quarter were $22 and $37, respectively.

5. Category V: Institutions with Credit Headcount Enrollment of Over 15,000 Students

Some 38 institutions reported in this largest size category.

Table 14 - Computer Expenditures as Percent of College Total Operating Expenditures and Allocation between Academic and Administrative Support--Over 15,000 Student Category

	Percentiles				
	12.5th	37.5th	50th	62.5th	87.5th
Computer Operations	1.0%	2.0%	2.1%	2.8	4.9%
Total Computer Costs	1.1%	2.4%	2.7%	3.6%	6.0%
Academic Costs	4.8%	20.0%	29.4%	36.0%	50.0%
Administrative Costs	48.3%	60.4%	70.0%	75.0%	92.5%

- The median institutions spent 2.1% of college total operating expenditures for "normal" computer operating expenditures and 2.7% for total computer-related expenditures. Modal figures for the upper quarter were 4.9% and 6.0%, respectively.

- The median figures were 29.4% of "normal" computer operating expenditures for academic support and 70% for administrative support. Modal figures for the upper quarter were 50% and 92.5%, respectively.

Table 15. Computer Expenditures Per Credit Headcount Student--Over 15,000 Student Category

	Percentiles				
	12.5th	37.5th	50th	62.5th	87.5th
Computer Operations	$ 7	$ 21	$ 26	$ 29	$ 44
Total Computer Costs	12	31	39	49	79
Academic Costs	1	3	6	9	14
Administrative Costs	5	13	14	20	44

- The medians of these largest institutions spent $26 per credit headcount student for "normal" computer operating expenditures and $39 for total computer-related expenditures. Modal figures for the upper quarter were $44 and $79, respectively.

- The median figures for "normal" computer operating expenditures were $6 per student for academic support and $14 for administrative support. Modal figures for the upper quarter of this group were $14 and $44, respectively.

* * * * *

This paper has summarized the results of the "first-ever" study of nationwide experienced "norms" of the allocations by two-year colleges of resources to the computer function. It is hoped that the results will prove useful both to the two-year colleges and to the broader higher education constituency. NACUBO is already underway in repeating this study for the current year.

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